REPORT OF THE WORKSHOP

“Foresight scenarios for the dairy sector in Indonesia”

Past experiences and future challenges to design sustainable policies and strategies

Organized on Tuesday, December 4th, 2018

at IPB International Convention Center, Bogor (Indonesia)

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and NGUYEN Mai Huong (Coord.)

December 2018

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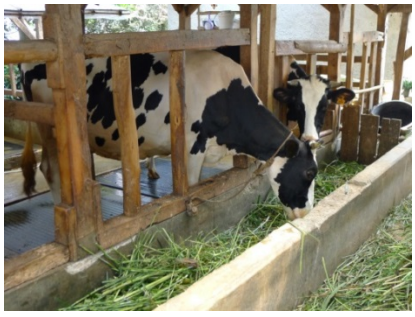
SUMMARY

The workshop on "*Foresight scenarios for the dairy sector in Indonesia*" took place at the IPB International Conference Center in Bogor on 4 December, 2018. It was organized by IPB and CIRAD with a support from the French Embassy. The specific objective of the workshop was to review the strategic vision and plan of the dairy sector in Indonesia and to initiate a foresight participatory exercise. The workshop gathered around 40 participants, including members of public agencies, staff of private firms (Danone group, Fonterra, Cimory), managers of cooperatives (KPSBU, KPS Bogor), farmers, lecturers, researchers and journalists. The workshop agenda covered: (i) a review of the "Blue Print" vision for the dairy sector to 2025; (ii) an update of the dairy development strategy of the ministry of Agriculture; (iii) a foresight exercise on the dairy sector conducted in 2016 in Vietnam, which brought an interesting comparison perspective and illustrated the foresight approach; and (iv) some research results on the sustainable development of dairy farms in Indonesia. The afternoon session was devoted to a participatory exercise that led to the proposition of three contrasted scenarios for the dairy sector. The first scenario which is named "*Industrial integrated dairy* envisions the emergence of an industrial value chain with medium-scale and large farms integrated with processing industries. This scenario would give high economic returns, but it would exclude most of the local smallholder farmers, and would lead to the collapse of the dairy cooperatives. It would also bring environmental challenges to local communities. The 2nd scenario titled "*community-based dairy sector*" relies on the development of dairy zones that would support both community development and national milk production. Those dairy zones would be strongly supported by private firms and by dairy cooperatives that would unify to create one major dairy processor, as it is the case in some European countries. Those 2 first scenarios would be supported by strong policies to promote milk consumption at home, at school, and in the whole society. The 3rd scenario refers to the "*development of vegetable drinks*". Contrarily to the other scenarios, it foresees the decrease of milk consumption and the collapse of the whole dairy sector. In the future, a modelling exercise could help to assess the expected impact of those 3 scenarios with quantitative indicators.



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INTRODUCTION TO THE WORKSHOP

1. General context of the dairy sector in Indonesia

In Indonesia, the dairy sector is changing rapidly. Between 1985 and 2012, milk production has been multiplied by 5. The domestic milk supply rose from 0.2 to nearly 1 million tons. In the same time, many dairy processing industries were set up. The emergence of a dynamic dairy sector has been a response to the rise of the demand for dairy products. In the same period, the Indonesian population grew from 150 to 261 million, and per capita milk consumption jumped from 3 to 17 liters/hab/year.

This rapid dairy development has relied mostly on smallholder farms, thereby providing high economic and social impacts on rural communities. The Indonesian milk production essentially comes from small farms raising 3 to 4 dairy cows on average. According to the 2013 Agriculture Household Census, milk production contributes to the livelihoods of 144,000 families, including some of the poorest who have a limited access to land and capital. Around 60% of them are members of around 100 cooperatives. This situation makes Indonesia one of the most efficient countries in the world to develop inclusive dairy business models.

However, since 2011, the growth of the dairy sector has stopped. Between 2012 and 2015, the domestic milk production decreased from 1 million to 800 000 tons. As a result, the share of the milk powder imports in the total consumption has grown. Between 2000 and 2018, dairy imports soared from 1 to 3.7 million tons liquid milk equivalent (LME), representing today more than 81% of the domestic consumption.. Even if the production has started again to grow since 2015, reaching 923 000 tons in 2017, the competition from imported powder milk appears to be a major constraint to the development of local farms. In addition, Indonesian farmers are facing many technical and organizational constraints.

In that context, several partners have been invested in designing **new types of partnership between farmers, cooperatives, government services and private processors.** Those partnerships are expected to forster the collection of local milk. The objective of such initiatives is to promote sustainable and inclusive dairy value chain with good economic, environmental and social performance. The Regulation n° 26/2017 of the Ministry of Agriculture on milk supply and distribution introduces some tools to support those types of partnership between **“business participants”** and **“farmers organizations”**. Even this regulation was amended in 2018 by the Regulation n°33 that suppressed the obligation for private firms to follow the guidelines of livestock authorities to improve the collection of local milk, all partners remain involved in building new types of partnership. In many provinces, technical and institutional solutions have been tested to support the collection of local milk by processing industries, and to enhance local development in rural communities.

2. Objectives and opening speeches

Given those challenges, partnerships between researchers and value chain stakeholders are needed to better identify those technical and institutional solutions towards sustainable dairy development. In that context, a workshop was organized in Bogor on December 4th, 2018.

The objective of the workshop was to support strategic decisions of public and private stakeholders involved in the development of the dairy sector. The specific objectives were to review the strategic vision and plan of the dairy sector in Indonesia designed by the Government as the "Blue Print", and to initiate a participatory foresight exercise on the dairy sector in Indonesia. To reach this specific objective, a review of the foresight exercise conducted on the dairy sector in 2016 in Vietnam was proposed (Nguyen Mai Huong et al., 2018). And some new research results on sustainable development of milk production in Indonesia were presented (Sembada et al., 2018).

The workshop was co-organized by IPB and the French Center for Cooperation in International Agriculture Research (CIRAD), in partnership with public and private stakeholders. It was supported by the French Embassy in Jakarta. This workshop was an opportunity to disseminate CIRAD and IPB research results, and to identify future research needs.

Around 40 participants joined the workshop. They were members of public agencies (ministry of Agriculture, coordinating ministry of Economic Affairs), staff of private firms (Danone group, Fonterra, Cimory), managers of cooperatives (KPSBU, KPS Bogor), farmers (from Bogor and suroundings), lecturers, researchers (IPB, CIRAD) and journalists (*See list of participants in the Annexes.*)

In the opening speech, Dr Arief Darjanto, Dean of the IPB Vocational School, welcome all participants. The objectives of the workshop and arising questions in the dairy sector were underlined. He mentioned that among those, the question: "How to make farmers wealthier?" was a question of high interest.

In his welcoming address, Prof Nicolas Gascoin, scientific cooperation attaché at the French Embassy in Jakarta, thanked the organizing institutions for their invitation. He insisted on the need for research to deliver innovations that can support economic competitiveness and to draw recommendation for policy decision. He mentioned that the present workshop would contribute to produce knowledge for decision making.

Later in the morning, Dr Arif Satria, Rektor of the Institut Pertanian Bogor (IPB), had the opportunity to come and congratulate the presentations. His presence attested the engagement of IPB in designing solutions for the future of agriculture and livestock in Indonesia.

Dr Arif Satria
Rektor of IPB

Dr Arief Darjanto
Dean of IPB Vocational School

Prof Nicolas Gascoin
from the French Embassy

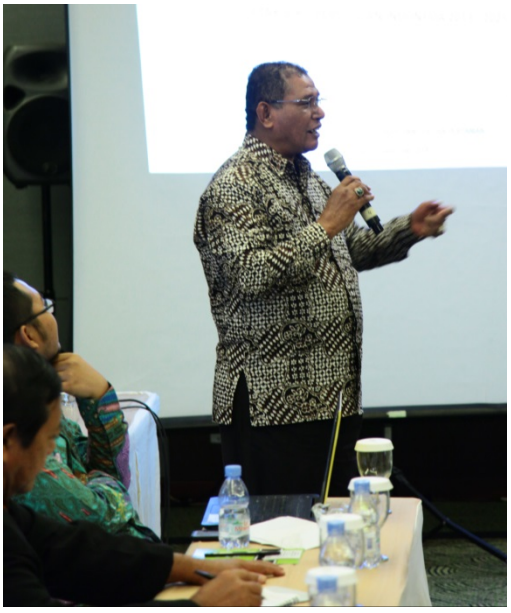
REPORT ON THE PLENARY SESSION (Morning)

Summary of the 4 presentation

1. Strategy and action plan of the "Blue Print" for the dairy sector in Indonesia

Presentation 1 made by Mr Jafi Alzaglagi (Assistant Deputy for Livestock and Fisheries, Coordination Ministry for Economic Affairs, Indonesia)

Mr Jafi Alzaglagi presented the "Strategy and action plan of the blue print for the dairy sector in Indonesia 2013-2025" (in Bahasa Indonesia : *Strategi dan rencana aksi cetak biru persusuan Indonesia 2013 – 2025)*. From a global perspective, USA, India, China, and Brazil are the world leading milk producers. Regarding the current situation in Indonesia, the milk consumption increases by approximately 5% per year while the milk production only increases by 2%. Those imbalanced increases explain the high proportion of imported products (81%) compared to local production (19%) in order to meet the increasing domestic demand. It might related to some factors. Farmers face many challenges, such as: small cow herd, traditional production techniques, low milk price, limited access to credit, long distance milk chains, low profitability, and irregular milk quality. To respond to the high milk demand and to cope with deeper international integration characterized by a number of free trade aggreements (WTO, AUS-NZ-ASEAN), domestic production need to be supported and improved in order to increase local production.



The Government launched a dairy development strategy called "Blue Print for the dairy sector 2013-2025". One of the main important objectives is to improve partnerships among value chain stakeholders. Partnerships should be based on the triangle development aspects: economic, social and environment. The main policies to be applied are: fostering the investment in favor of the shift of small farm to middle-scale and large-scale farms, changing production paradigm from quantity-based to quality and value-based, and increasing partnerships through trust and dependency. The Government also needs to provide incentives to farmers to boost their innovations and willingness. "The blue print for the dairy sector" is designed for 2015-2020 and 2021-2025. It is expected to promote milk for interest of the whole country.

In the "question and answer" session, participants asked about how the collaboration and partnerships can work well. Mr Jafi explained that "trust" and "dependence"

among stakeholders are needed. Routine meetings between them are also important in order to build better relationships between stakeholders. Other participants asked about how to protect local producers in the competition against global producers since we have more Free Trade Agreements (WTO, ASEAN-Australia-New Zealand). In response, Mr Jafi said that some actions could be applied such as shortening milk chain, improving local partnerships, promoting young generation farmers, increasing the number of cows, and fostering cows insurance. Participants from the dairy industry expressed their concerns about finding the right strategies for scaling up from middle-size farms to large-scale farms, for supporting fresh milk sourcing instead of milk powder in the process of dairy products, and for improving cow breeding. Mr Jafi explained that both partnerships among stakeholders and Government support can help farmers, cooperatives, and dairy industry companies to respond to those challenges.

2. The Updated National Dairy Development Strategy in Indonesia

Presentation 2 made by Mr Fajar Sumping Tjatur Rasa (Director of Animal Health, Ministry of Agriculture, Indonesia)

The presentation started by presenting the current situation of dairy sector in Indonesia. A great majority of farmers in Indonesia are smallholder farms (around 144,000 families according to the last census). Most of them are members of cooperatives. In some of those smallholder farms, dairying is a « side business ». The domestic dairy production is centralized in Java island. In recent years, the population of dairy cows has decreased. However, the rise of milk production could not follow the increase of milk consumption. Consequently, milk import increased to reach 3.7 millions tons in 2018.

The dairy sector is facing many challenges. In the off-stream segments, the challenges refer to milk quality and milk safety. In up-stream segments, farmers deal with animal health constraints (for instance mastitis and distokia). Other challenges refer to the need to empower farmers to supply milk to the industry or to small scale processors that process for instance milk crackers and caramel (home industry). Fresh milk in the market is not the main priority for the consumers. It should promote the importance of the fresh milk.

To overcome some challenges, the following actions should be applied. Firstly, improving high quality of milk can be done with incentive or penalty system. Farmers having low TPC (total plate count) and high fat content should receive better price or incentive, and *vice versa*. Secondly, the dependency on milk import can be lowered

by increasing the competitiveness and local production. Local production can be improved by managing sustainable partnerships in order to increase profitability among stakeholders. The transparency of rising up milk price is needed to make farmers wealthier. Lastly, if the production and consumption increase simultaneously, the quality of life will be better for all stakeholders of the value chain.

The presentation made by Mr Fajar gave rise to questions and comments. Participants from milk industry asked about incentives, subsidies and commitments that are necessary to use milk fresh as main ingredient for final products. Mr Fajar commented free trade aggreements do not allowed to give incentives or subsidies per liter of milk, though other systems are used by many countries. Several solutions might be applied such as transparent labelling to guaranty a specific label for milk products produced exclusively from fresh milk. A farmer who is a member of Perpami (Indonesia young farmers association) shared some experience about his farm and his business. He also asked about the protection from government about land for livestock. Mr Fajar responded that the policy for land use should be applied in the future in order to guaranty the use of land for agriculture and to offer opportunities for investors.

3. Sustainable development of milk production farms in Indonesia: supporting farmers' assets, pluri-activity, and productivity

Presentation 3 made by Mr Pria Sembada (Lecturer, Bogor Agricultural University, Indonesia)

Milk consumption in Indonesia increases rapidly. However, the national milk production can not satisfy the national milk demand. Local production only provides about 20 percent of domestic consumption (BPS, 2013). The vast majority of farmers in Indonesia are smallholders with about 3-4 cows and less than 0.3 hectare per farm. Smallholders face many challenges such as limited access to land and capital, know-how, low producitivity, and poor market access. The sustainability of dairy sector is questioned.

Capital and pluri-activity are crucial in smallholder production systems. They play an important role to increase the sustainability of dairy farms. Farmers need support from banks, government services and private firms to increase their capital. Access to credit can be enable farmers to have higher production ouputs. Capacity building and training are also needed to improve farmers' know-how. Access to input production and market access will support the continuity of dairy business. Last but not least, diversification at farm level result in more sustainable farm businesses.

4. Future vision of the Vietnamese dairy sector: results of a foresight exercise

Presentation 4 made by Mrs Nguyen Mai Huong (Researcher, IPSARD, Vietnam)

Mrs Nguyen Mai Huong presented the situation of dairy sector in Vietnam. Per capita milk consumption in Vietnam increased rapidly from 5.8 kg (2000) to 22.5 kg (2014). There are three factors explaining this situation: economic growth, demographic growth, and rapid urbanization. The local milk production increased drastically (more than 10 times) in the last 14 years in response of the increasing of milk consumption. However, the local production only covered about 30% of national milk demand.

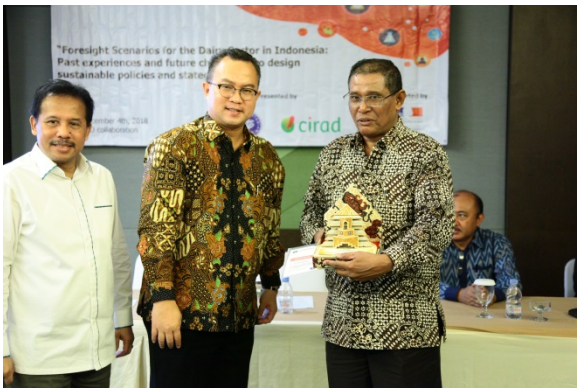
In the last three decades, dairy development followed three main periods: During the "collective economy" period (until 1986), dairy production was restricted to State farms. During the years that followed the "Doi Moi" reforms (from 1990 to 2010), family farms were the main model for milk production. More recently, a new « modernization » period has started (since 2010) that gives more place to large-scale « mega farm ». Recent Government policies underline the need to support large-scale family farm (more than 30 cows) and mega farms (more than 500 cows). It then raises a question of the future of the dairy sector. Considering inclusive and sustainable development, what are the future scenarios for the dairy sector in Vietnam?.

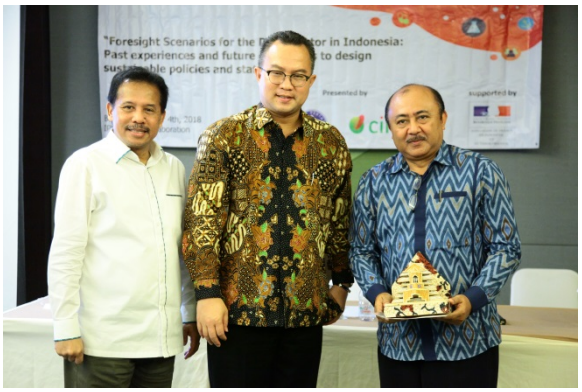
The approach to build foresight scenarios uses both retrospective approaches and prospective approaches. Retrospective approaches rely on reviewing past experiences, while prospective approaches refer to what "could" happen in the future. The participatory scenario planning exercise involved different stakeholders from local to national level to build plausible scenarios. This approach was used by a research team in 2016 to build foresight scenarios for the dairy sector in Vietnam. Both qualitative analyses (storylines) and quantitative simulations were used to come up with some contrasted scenarios. The quantitative simulations allowed to assessing the impact of the 3 contrasted scenarios on sustainability indicators. Social, economic and environmental indicators were chosen. **Those results were published in a policy brief** (Nguyen Mai Huong et al., 2018).

The exercise led to the proposition of 3 foresight scenarios for the dairy sector in Vietnam to 2030. The "maximum concentration" scenario refers to a situation where milk is only produced by mega farms. The second scenario is named, "social and inclusive" dairy sector scenario. It refers to fostering small farms that could become the only milk producers. The third scenario named "smiling cow" scenario is a

scenario based on the co-existance of both mega farms and small farms. The 3scenarios would balance supply and demand. But each scenario would bring different impacts in term of local land, labor and environment aspects. In particular, the “social inclusive” scenario would provide employment for 116,000 workers in milk production farms, whereas the “maximum concentration” scenario will only provide 17,500 jobs in milk production. The “smiling cow scenario would balance between domestic milk supply, employment creation and environmental impacts.

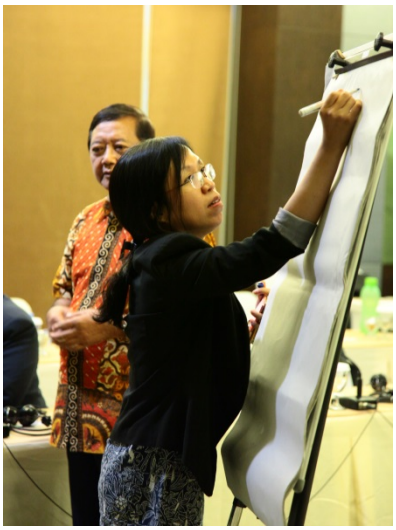
After those 4 presentations, a short wrap-up session allowed the chairman to draw some conclusions. He insisted on the interest to compare the situation between Indonesia and Vietnam.



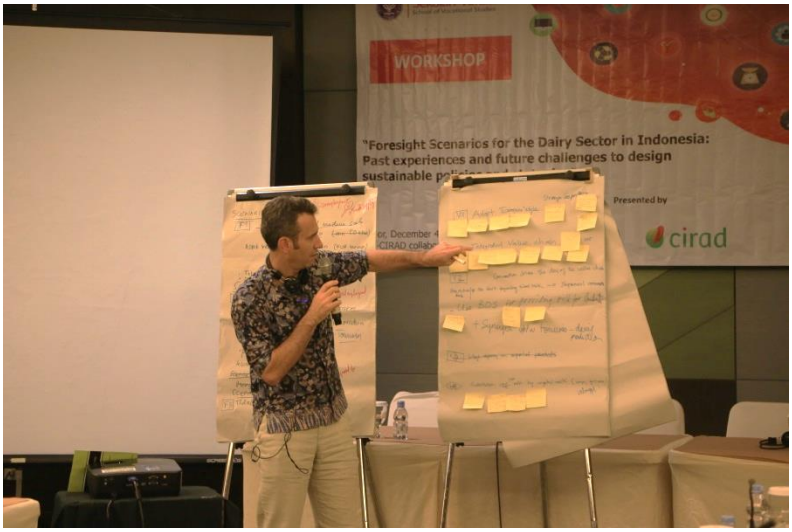


REPORT ON THE FORESIGHT SESSION (Afternoon)

The second session of the workshop was devoted to building contrasted foresight scenarios “Towards a sustainable future of the dairy sector in Indonesia". This foresight exercise was chaired by Edi Basuno, and facilitated by Guillaume Duteurtre and Nguyen Mai Huong.



Nguyen Mai Huong (IPSARD)



Guillaume Duteurtre (CIRAD)

1. Objectives of the foresight exercise

Future studies are increasingly mobilized by researchers and policy deciders to design sustainable policy orientations. We believe that this method can efficiently support the design of strategies in line with the rapid changes happening in the dairy value chains, in particular in Southeast Asia.

A scenario “*is simply a means to represent a future reality in order to shed light on current action in view of possible and desirable futures*” (Godet, 2001). Integrated scenarios can be defined as coherent and plausible stories, told in words and/or numbers, about the possible co-evolutionary pathways of combined human and environmental systems (Swart et al., 2004). Rather than attempting to forecast a single future, agri-food scenarios represent multiple plausible directions that future changes may take and what these directions would mean for food security, environment or rural livelihoods (Nguyen Mai Huong et al., 2017). Foresight scenario methods rely on three complementary elements: Participatory workshops that involve representatives of the concerned community, qualitative storylines, and quantitative modelling (Paillard et al., 2014). Scenarios can help the assessment of future developments under conditions of uncertainty, human choice and complexity (Swart et al. 2004; Bodirsky et al. 2015).

This approach has been applied in particular in the dairy sector. It consists of drawing contrasted scenarios for the future of the dairy sector in order to identify sustainable trajectories and policy options. The method has been used by dairy researchers and

experts in various regions of the world, including Brazil (Spers et al., 2013), Europe (Bouamra-Mechemache et al., 2008), France (FranceAgriMer, 2017), Vietnam (Mai Huong Nguyen, 2017) and Indonesia (Kementerian Pertanian, 2011 and 2016; Kementerian Koordinator Bidang Perekonomian, 2014).

The objective of this session was to build several scenarios for the future of the Indonesian dairy sector to 2025, and to draw a rapid assessment of their impact on sustainable development. The introduction of alternative scenarios would guide strategic decision-making of local authorities and private dairy stakeholders, in particular in view of the Decision 26/2017.

2. Method and TORs of the work groups

Organization of the work groups

The group included different value chain stakeholders: some smallholder farmers, leaders of cooperatives, large farms, processors, public authorities and many experts of different background. The composition of the group brought diversity of points of view that were necessary for building different contrasted scenarios. The group was facilitated by 2 animators that had been involved in other foresight scenario planning exercises (Guillaume Duteurtre and Nguyen Mai Huong).

First plenary presentation

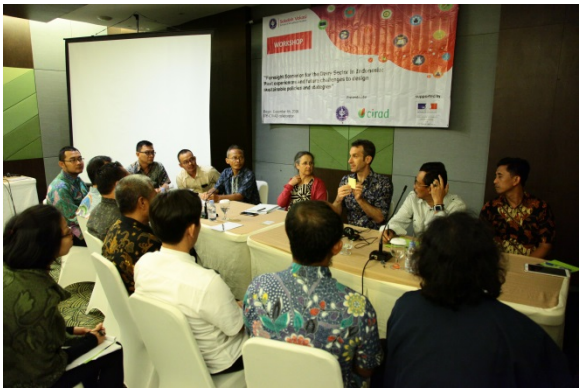
The session started by a plenary presentation (**Step 1**) made by the facilitators to remind every participant the objectives of the session. The facilitators underlined the fact that “foresight” is not “foresee”, and that the group should imagine “possible” and “suitable” futures. Those futures might not happen, but they are designed to help stakeholders to take strategic decisions.

Work groups to build partial scenarios

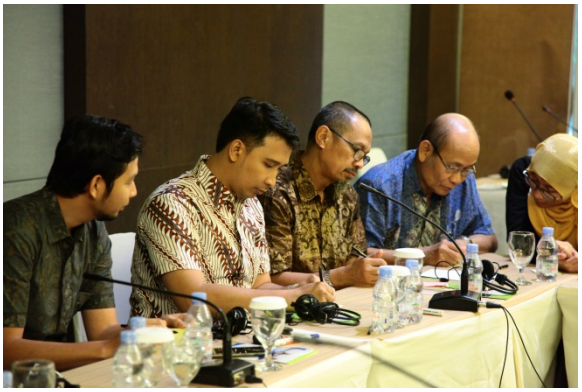
After this plenary presentation, participants were split into 2 work groups that had complementary terms of reference. The first group was asked to build some partial scenarios on “farms and landscapes”, whereas the second work group worked on partial scenarios on “value chains”. Those two approaches would bring complementary partial scenarios based on different “scales” of analysis.

Each work group started by a “speed meet” (**step 2**) to identity the main “drivers” and “changes” that are expected to happen, and the “impacts” of those changes. Participants in each group organized themselves into 2 to identify key “drivers and changes” and “impacts”, and wrote them on colored post-its: yellow post-its for “drivers and changes” and rose post-its for “impacts”. Post-its were then fixed on a paper-board and discussed within the group to build a common understanding of future changes and impacts (“brainstorming time”).

Those brainstorming sessions were followed by a group discussion to come up with some “plausible” and “contrasted” partial scenarios (**step 3**). Participants were asked to propose open scenarios in view of the general picture that had been discussed in the brainstorming. Those scenarios were drawn on the paper-board. After a detailed description of 3 or 4 contrasted partial scenarios, the expected impacts of each scenario were discussed. In each group, a “rapporteur” prepared a short presentation of the 3 or 4 contrasted partial scenarios: one for the partial scenarios on “farms and landscapes” (group A); and one for the partial scenarios on “value chains” (group B). The work groups lasted 1 hour 1/2.



Group A (farms and landscapes)



Group B (value chain)

Last plenary session to build global scenarios

The two work groups gathered for a last plenary session where partial scenarios were presented by rapporteurs (**step 4**). Those partial scenarios were discussed, and participants were asked to comment those scenarios and their designations. This discussion allowed the group to reach a common agreement on the different partial scenarios that were listed.

After this discussion, the facilitators proposed to merge the different partial scenarios into global scenarios (**step 5**) which were displayed in a table. This synthesis was made collectively by all participants, in order to reach a consensus on the qualitative description of each scenario. Some comments were made to qualitatively assess the expected impacts of those scenarios on sustainable development.

3. Partial scenarios for farms and landscapes (Results of the group A)

In the first group, the brainstorming session allowed to list the main drivers, changes and expected impacts on “Farms and landscapes” (*See Table A in Annex 4*). In this group, 3 partial scenarios (F1, F2, F3) related to “Farms and Landscapes” were proposed:

***Partial Scenario F1/* Development of medium scale and large-scale farms**

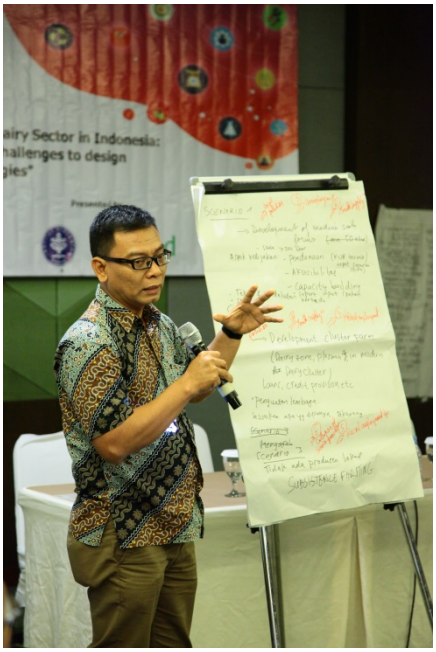
In this partial scenario, the main objective of the government is to reduce quickly the import dependency of the country. Priority is given to the development of medium

scale farms (50 to 250 cows) and large-scale farms (more than 250 cows) that will be able to produce more milk very quickly. Those farms will rely on private investments and on imports of heifers from New-Zealand, Australian and Europe. The government policies will be business-oriented. They will support this develop by investing in human resources development (training and high education), access to information and to finance, technological development and land access to private investors. Smallholder farmers are supported only if they can grow their herd up to 50 cows and more. But the smallest are advised to switch to other agricultural and non-farm activities or to migrate to urban centers. The cooperative system collapses progressively.

Expected impact of F1: The national milk production increases rapidly. But rural communities hardly suffer from this policy orientation. The development of large farms generates few jobs and high concentrations of livestock effluents that affect local ecosystems, except if the government subsidizes specific equipment to treat livestock effluents. Social movements demonstrate against non-equitable development and the collapse of the cooperative system.

***Partial scenario F2/* Development of Dairy clusters (dairy zones)**

This second partial scenario is based on the development of “dairy zones”, i.e. dairy clusters that involve the development of complementary activities in rural communities. Those dairy clusters are based on existing cooperatives and include local smallholder farmers, medium-scale farms, milk processors, feed processors, and other organizations supporting the sustainable development of the dairy sector in the given communities. The national dairy development policy promotes local **partnerships** between farmers, cooperatives and private firms, as it is the case today. But the policy requires a stronger engagement of private firms to improve the share of local milk in their raw materials, to provide services to farmers, and to develop Standard Operational Procedures (SOPs) with farmers. Credit programs and capacity building for smallholders, cooperatives and private firms are some of the tools of this policy orientations. Many crop farmers and feed processing units also benefit from the growing demand for feed.



Expected Impact of F2: The national milk production increases rapidly. Rural communities are empowered and many jobs are created in the dairy zones. Environmental management is supported by local partnerships between farmers, cooperatives, private firms and local authorities. The markets for feed raw materials and for green fodders are very dynamics; they also provide jobs in those rural

communities.

***Partial scenario F3/* No more local production**

In this partial scenario, because of a low demand for dairy products, the price of milk falls down. Animal products are said to be environmentally costly and bad for health. The Government does not promote milk consumption at all. In that context, due to a shift in the perception of milk products, consumers prefer to consume vegetable drinks and other vegetarian products. Simultaneously, the price of feed rises up. As a result, dairy farmers quit dairying. They invest in horticulture, crop production, or other non-farm activities, and some of them migrate to urban centers. All milk products are imported from abroad and those imports reduce progressively.

Expected impact of F3: The consumers are not able to consume local dairy products anymore. All products are imported, which increases the trade deficit and import dependency. Rural communities previously involved in dairying badly suffer from this crisis.

4. Partial scenarios for value chains (Results of the group B)

In the second group, the brainstorming session allowed to list the main drivers, changes and expected impacts on “Value chains” (See Table B in Annex 4). In this group, 4 partial scenarios (V1, V2, V3, V4) on “Value chains” were proposed:

***Partial Scenario V1/* The chain follows a “European” development pattern with strong unified cooperatives**

In this scenario, the value chain is organized with an increasing role of strong unified cooperatives and empowered dairy farmers. The cooperative business models and standardize procedures (such as “Standard Operating Procedures” SOPs) facilitate the link between farmers and industries. Cooperatives take the lead role in controlling the quality of the milk sourced from farmers, so that processing plant can use standardized milk with satisfactory quality. Capacity building programs are delivered to farmers by cooperatives (for those who are members) or local authorities (livestock services). Those programs support farmers to improve and upgrade their farming practices. Smallholders become more and more professional and increase their herds and know-hows thanks to a strong credit system and importation of heifers. Cooperatives also improve their knowledge on milk processing and marketing and on market distribution and adaptation. The direct sales from farmers to the consumers are valorized through high quality fresh milk or cottage industry products. The supply chain is shortened with the absence of middlemen.

Expected impact of V1: The competitiveness of the local dairy sector is increased. Quality management is enhanced. Communities involved in dairying beneficiate from this development pattern. Large-scale powerful cooperatives are involved in

monitoring dairy development with clear economic, social and environmental indicators.

***Partial Scenario V2/* Integrated value chain**

The integrated value chain is characterized by large processors acting as “lead firms”. All input facilities of the farms are provided by the companies and the farmers have low bargaining power. The companies also invest in their own farms. Increased dairy herd and upgraded production technology leads to a tripled production output in few years. Integrated information systems from production to consumption are set up and accessible on the internet. All dairy products can be traced from the origin with all related information thanks to effective traceability system.

Expected impact of V2: Consumers find more trust in the quality of the products and transparency of the value chain is improved. Investments in the private sector generate high profits that are concentrated in a few private dairy companies. The dairy sector becomes highly concentrated. Many smallholder quit dairying and rural communities suffer from this concentration.

***Partial Scenario V3l* Consumption drivers to the development of the value chain**

In this partial scenario, together with the School Milk program, some awareness raising campaigns are set up across the country by government services. They promote new consumption habits and underline the nutrition value of the dairy products. Those campaigns lead to an increased consumption of the dairy products. The value chain is developed with the various distribution system and different product segments. In the context of increasing international integration, more foreign products are imported to Indonesia, so that consumers have more choices for their consumption. The development of local processing units is driven by the high demand.

***Partial scenario V4l* Substitution of raw milk by vegetable drinks**

In this partial scenario, the consumption of vegetable drinks and vegetarian products progressively replaces dairy products. Those changes are driven by income increase, changes in the diets and changes of lifestyle of consumers. They are also based on environmental concerns: animal production is claimed to pollute local environment and to produce Green-house gaz. Consumers also become aware of some risks related to the consumption of dairy products that are not proven scientifically, but that

are claimed by public medias and opinion movements that come from Europe. Vegetable drinks progressively replace milk, i.e raw milk is substituted by soya drinks, almond milk, and other vegetable liquids.

5. Contrasted global scenarios (Synthesis results)

The last plenary session allowed the group to merge the different partial scenarios into 5 global scenarios:

Table C: First proposition of synthesis scenarios

Global scenarios	Partial scenarios (Farms and landscapes)	Partial scenarios (Value chains)
Scenario 1 **Industrial integrated dairy sector**	F1 Medium and large farms	V2 Integrated value chain
Scenario 2 **Community-based dairy sector**	F2 Dairy zones	V1 Strong unified coops
Scenario 3		V3 School milk consumption
Scenario 4 **Development of vegetable drinks**		V4 Devpt of vegetable drinks
Scenario 5 **No milk production**	F3 No milk production	

Those 5 scenarios can be merged into 3 contrasted scenarios (S1, S2, S3), as follows:

Table D: Revised proposition of synthesis scenarios

	Partial scenarios (Farms and landscapes)	Partial scenarios (Value chains)
Scenario S1 **Industrial integrated dairy sector**	F1 Medium and large farms	V2 Integrated value chain + V3 School milk consumption
Scenario S2 **Community-based dairy sector**	F2 Dairy zones	V1 Strong unified coops + V3 School milk consumption
Scenario S3 **Development of vegetable drinks**	F3 No milk production	V4 Devpt of vegetable drinks

Scenario S1/ Integrated Industrial dairy sector

In this scenario, the main objective of the government is to reduce the import dependency and to promote industries in order to compete on the regional market. On the production side, priority is given to the rapid development of medium scale farms (min 50 cows) and large-scale farms that are able to produce more milk very quickly. The development of those farms relies on private investment and business projects. Investors set-up industrial farms by importing heifers from New-Zealand, Australian, or Europe. They also import high technology equipment and machineries

to produce feed crops, herd management techniques, milking parlors, water treatment systems, rationing, silage and hay. The government policy is business-oriented and organizes large campaigns for school milk consumption. It supports processing industries in setting up their own farms on private land. Those investments are made thanks to the support of public institutions in human resources development, access to information and to finance, suppression of all import taxes and access to land for private investors. Smallholder farmers are not supported by public services, except for those able to raise 50 cows and more. For the others, they are advised to switch to other agricultural and non-farm activities, or to migrate to urban centers. Neither private companies nor local authorities are engaged in managing livestock effluents because of its high cost. Solid effluents are sold to horticulture and coffee farms, but liquid effluents spread around large-scale farms and leak into underground water.

Expected impacts of S1: The cooperatives collapse progressively. The dairy sector becomes more and more integrated, with large companies being able to produce milk, process it and distribute standardized dairy products. Those companies export dairy productions to many countries of the world. Very few small-scale companies remain, resulting in the concentration of milk production in a limited number of areas. Indonesia becomes a major dairy exporter, and the import dependency is reduced. But some firms continue to import powder milk for products that do not require fresh milk. Large farm reject a lot of effluents in their surrounding areas, which creates environmental problems, but they support CSR projects in the local communities to compensate those pollutions. Rural employment is reduced, since the large farms have a much higher labour productivity than family farms. Many communities that were formerly involved in milk production are suffering from the collapse of the cooperative systems. Only a small number of farmers who are able to invest to grow up to the minimum size of 50 cows remain active in the dairy chain.

Scenario S2/ Community-based dairy sector

In this scenario, the objectives of the government are to promote dairy development, to reduce import dependency and to support community development. The dairy development strategy is based on the development of “dairy zones”, i.e. dairy clusters that involve many complementary activities in rural communities. Those dairy clusters are based on existing cooperatives, and they also include local smallholder farmers, medium-scale farms, milk processors, feed processors, and other organization supporting the sustainable development of the dairy sector in the given communities. The cooperatives merge together to create a major industrial cooperative (a kind of “super GKSI”) that becomes a major milk processor. The livestock authorities promote local partnerships between farmers, cooperatives and private firms. Private firms and the “super GKSI” are supported to improve the share of local milk in their raw materials, to provide services to farmers, and to develop Standard Operational Procedures (SOPs) with farmers. Credit programs and capacity building programs for smallholders, cooperatives and private firms are some of the

tools of this policy orientation. Many crop farmers and feed processing units also benefit for the growing demand for feed. The Government is also involved in dairy products promotion policy that involves School milk programs, milk campaigns, and the support of dairy products labelling. Many “short” value chains develop to market fresh milk and local products directly to consumers. In the same time, industrialzed milk products are marketed by “super GKSI” through supermarkets and innovative distribution networks.

Expected Impact of S2: The national milk production increases rapidly. Rural communities are empowered and many jobs are created in the dairy zones. Environmental management is supported by local partnerships between farmers, cooperatives, private firms and local authorities. Milk consumption increases very rapidly in the whole country, including in rural areas.

Scenario 3/ Development of vegetable drinks

In this partial scenario, the consumption of vegetable drinks and vegetarian products progressively replaces dairy products. Those changes are driven by income increase, changes in the diets and changes of lifestyle of consumers. They are also based on environmental concerns: animal production is claimed to pollute local environment and to produce green-house gaz. Anti-milk campaigns are conducted by environmental NGOs and international organizations through public medias and opinion movements that come from Europe. Vegetable drinks progressively replace milk, i.e raw milk is substituted by soya drinks, almond milk, and other vegetable liquids. Consequently, the demand for milk and milk products decreases. As a result, dairy farmers quit dairying. They invest in horticulture, crop production, or other activities, and some of them migrate to urban centers.

Expected impact of S3: The consumers do not want to consume dairy products any more. Rural communities previously involved in dairying badly suffer from this new trend. They develop new income generating activities to diversify their livelihoods. Some of them migrate to urban centers.

6. Conclusion of the foresight exercise

The participation of many stakeholders in the workshop organized in Bogor allowed open discussions to take place. Strategic development issues and priorities for research in partnership were debated. The participatory foresight exercise led to the proposition of three contrasted scenarios for the dairy sector that will help to discuss those priorities.

The 1st scenario named **“Industrial integrated dairy**” envisions the emergence of an industrial value chain with medium-scale and large farms integrated to processing industries. This scenario would give high economic returns, but it would exclude most of the local smallholder farmers, and would lead to the collapse of the dairy

cooperative system. It would also bring environmental challenges to local communities.

The 2nd scenario titled **"community-based dairy sector"** relies on the development of dairy zones that would support both community development and national milk production. Those dairy zones would be strongly supported by private firms and by dairy cooperatives that would unify to create one major dairy processor ("super GKSI"), as it is the case in some European countries. This scenario, as the first one, would be supported by strong policies to promote milk consumption at home, at school, and in the whole society.

The 3rd scenario refers to the "**development of vegetable drinks**". Contrarily to the other scenarios, it foresees the decrease of milk consumption that could lead to the collapse of the whole dairy sector.

However, those "qualitative scenarios" and "impacts" are based on discussions. They do not rely on a strong quantitative assessment. In the future, a modelling exercise could help to assess the expected impact of those 3 scenarios with quantitative indicators in a more scientific manner. The method developed in the Vietnam foresight exercise (Nguyen Mai Huong et al., 2018), would certainly be useful for such a quantitative scenario impact assessment.

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ANNEXES

ANNEXES

1. ANNEX 1/ LIST OF PARTICIPANTS

Name	Position	Institution
drh Fajar	Director Animal Health	Ministry of Agriculture
Ir Jafi Alzaglagi	Assistant Deputy of Livestock and Fisheries / Deputy of Food and Agriculture	Coordination Ministry for Economic Affairs
Dr Arif Satria	Rector	IPB
Dr Arief Darjanto	Dean	IPB Vocational Sciences
Dr Bagus Priyo Purwanto	Vice-dean	IPB Vocational Sciences
Dr Pria Sembada	Lecturer	IPB Vocational Sciences
Dr Daisy Tambajong	Lecturer	IPB Vocational Sciences
Yuni Resti, MSc	Lecturer	IPB Vocational Sciences
Intani Dewi, MSc	Lecturer	IPB Vocational Sciences
Fariz Am Kurniawan, MSi	Lecturer	IPB Vocational Sciences
Danang Priyambodo, MSi	Lecturer	IPB Vocational Sciences
Gilang Ayuningtyas, MSi	Lecturer	IPB Vocational Sciences
Antonya, MM	Lecturer	IPB Vocational Sciences
Dr Lucia Cyrilla	Lecturer	IPB Faculty of Animal Science
Dr Despal	Lecturer	IPB Faculty of Animal Science
Aditya, MSi	Lecturer	IPB School of Business
Audi Joinaldy, MSc	Chief	HANTER IPB
Dr Guillaume Duteurtre	Researcher	CIRAD, France
Dr Nguyen Mai Huong	Researcher	IPSARD, Vietnam
Dr Edi Basuno	Researcher	Ex-ICASEPS, Ministry of Agriculture
Prof Nicolas Gascoin	Head of the Cooperation Office for Science & Technology	French Embassy in Jakarta
Arif Wahyudin	Climate and Agriculture Manager	Danone Indonesia
Amir Abdul Aziz	Coordinator to Indonesia	Danone Ecosystem Fund
Denise Burell	Dairy Development Advisor	Fonterra
Budwi Brontosantoso	Senior Manager Dairy Development and Government Affairs	Fonterra
Catur Nugroho	Director	PT Fajar Taurus
Septian Jasiah Wijaya	Owner	Waluya Wijaya Farm
Adieb	Member	PERPAMI
Bambang Sutantio	CEO	Cimory
Eno Suana	General Manager	Cimory
Dadang S		Cimory
Adang	Secretary	KPBS Pangalengan
Nanang R		KPS Bogor
Ramdan Sobahi	Secretary	KPSBU
Meliawati		Intrepreter

Rumonda lubis		Intrepreter
Dede	Communication Biro	IPB
Mawardi		Coordinator Ministry of Economic Affairs
Randy		Coordinator Ministry of Economic Affairs
Herlina		IPB
Nindya		IPB
Eko		IPB
Rangga Wirawan		Ministry of Agriculture
Inda		IPB
Jumiko		IPB
Usman		IPB
Jodi		Ministry of Agriculture
Cecep		IPB
Alex		IPB
Muhammad Arif		IPB
Triyoga Yusuf		IPB

2. ANNEX 2/ PROGRAM OF THE WORKSHOP

Foresight scenarios for the dairy sector in Indonesia
Past experiences and future challenges
to design sustainable policies and strategies

IPB International Convention Center (Bogor), December 4th, 2018

(the workshop will be in English with Simultaneous translation)

Chair: Arief Darjanto, Dean of Vocational Sciences of IPB (or Vice-dean)
Co-chair (and time keeper): Edi Basuno

8:00 Registration

Morning: Review of current knowledge and strategies (Plenary session)

8:30 Opening speech
(Arif Satria, Rector of IPB)

8:45 Welcome address
(Nicolas Gascoin, French Embassy representative)

9:00 The overall vision of the dairy sector to 2025: Blue Print scenario & strategy
(Jafi, Coordination Ministry of Economic Affairs) 30' presentation 5' clarification

9:30 The updated National dairy development strategy in Indonesia
(Jafi, Ministry of Agriculture) 30' presentation + 5' clarification

10:00 General discussion

10:40 Coffee break

11:00 Sustainable development of milk production farms in Indonesia: supporting farmers' assets, pluri-activity, and productivity
(Pria Sembada et al., IPB) 20' presentation + 20' discussion

11:40 Future vision of the Vietnamese Dairy sector: results of a foresight exercise conducted in 2016
(Nguyen Mai Huong, IPSARD, Vietnam) 20' presentation + 20' discussion

12:20 Presentation of the afternoon agenda

12:30 Lunch

Afternoon: Updating foresight scenarios for the Indonesian dairy sector (Participatory workshop)

13:30 Presentation of the Participatory workshop to build hypotheses and scenarios for the Indonesian dairy sector
(Guillaume Duteurtre, CIRAD)

13:45 Group 1 / Farms and Landscape *(Animator: G. Duteurtre CIRAD)*

Group 2 / Value chains *(Animator: Nguyen Mai Huong, IPSARD)*

15:15 Coffee break

15:30 Plenary session to present the conclusion of each groups

16:30 General discussion and conclusions

17:00 End of workshop
Closing speeches from hosting institutions *(CIRAD and IPB)*

3. ANNEX 3/ MAIN DRIVERS, CHANGES AND IMPACTS IDENTIFIED IN THE WORK GROUPS

Table A: Main drivers, changes and expected impacts on "Farms and landscapes" (Group A)

Drivers and changes	Expected impacts
Government support for : Small farmers Medium farms Local government support to dairy zones, dairy villages, dairy clusters Loans from the bank with or without special interest rate Subsidized equipment, imports of heifers, of straw (hay) New technologies for farmers : milk production, barns, milking machines, animal and forage tropical breeds… Improved farmers breeding practices, improved human resources on farm, capacity building, training and education, "millennium farmers", "start-up farmers".. Improve farm business management Regeneration farms with youngsters Integration between forage and forest production ; Integration between crop and livestock production Improved production of complete feed	Self-sufficiency in milk by 2020 Increased productivity, margins Increased quality of milk Increased quantity of milk Safe and sustainable dairy ("smar-farming", "demonstration farms") Increased interest for dairy production Professional maintenance Macro-economic results More effluent pollution Increased gap between poor and rich farmers

Table B: Main drivers, changes and expected impacts on "Value chains"

Drivers and changes	Expected impacts
Value chain organization:	
Farmers will be more trained and educated on how to processing milk and selling milk of quality to the market	Many start-ups in the dairy industry
Direct supply fresh milk from the farmers to consumers are more and more valorized	The value chain becomes shorter with the absence of the middleman
Empowerment of the cooperatives and there are standardized cooperative model in the dairy sector (the government set standard for the cooperative)	Cooperatives become stronger (in terms of organization, governance) and have more balanced role compared to the processor; The relationship between farmers and cooperatives are strengthened, more collective activities are carried out, bringing the benefits to both cooperatives and individual farmers; The bargaining power of the farmers are increased
Farmers and cooperatives interact in a special	More easy to manage the planning of dairy zone

Drivers and changes	Expected impacts
territory	(quality control, environmental investment)
The value chain is more and more integrated (facility, information,	The bargaining power of the farmer still low; Industry take the role of lead firm in the chain
Food system	
Rapid increase in local production (by three times)	Increasing domestic demand will be satisfied; Decrease of reconstituted milk in the market;
Modernized information system from farms to table will be installed; All information about the dairy will be avalailabe online (production, quality, …) → a traceability system is put in place (100% dairy products can be traced by the traceability system)	Improved transparence and accountability of all actors in the value chain
Distribution	
More cold chain distribution will be installed across the country	The supply chain will be longer, different dairy products will be delivered to everywhere in the coutnry
Improved quality of the dairy products; 100% dairy products are complied with the SMI	Quality of milk is increase so that the price is guaranteed
Consumption	
Consumption of milk product stays low;	The market for the dairy products are looming, so that the farmers are not interested in the dairy producing. The companies increase import dairy products from abroad The companies turn their strategy to the overseas market rather than the domestic market
The Government support more the Milk school program	Increase in the milk consumption in the domestic market
Changing diet habits of the consumers and their improved awareness about the importance of the product	Companies has strategy to produce organc milk and vegetal milk Substitution of the animal milk by the vegetal milk (soya, grains, nuts, ….)
Competition – Regulations	
Enhanced awareness of the consumers about the role and nutrition value of dairy products to the health	Increase in the milk consumption in the domestic market
The market price of milk product will increase	The market for the dairy products are looming, the poor people find difficult to consume dairy products;
With a number of new FTAs coming into effective, increased competition from imported powder milk and dairy products from abroad	More imported dairy products will be available in the market; The local producers have more interest in importing than investment in local dairy production
Stronger (more regulation) for milk product marketed (as the dairy product guarantees)	Quality will be improved, the consumers can get more access to the dairy products of quality
Stronger regulations on the price of milk products as well as regulation on the packaging and labelling (milk produced from fresh milk or reconstituted from powder milk)	Uniform price for the milk products; Producers become more confident and continue their production; Consumers find transparent information about the products they consume and find fair to pay for the product (fresh or reconstituted)

4. ANNEX 4/ REFERENCES

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5. ANNEX 5/ ECHO OF THE WORKSHOP IN THE LOCAL MEDIAS

Here are some links of the media:

1) https://ipb.ac.id/news/index/2018/12/walau-sudah-berusia-petani-jepang-melek-teknologi/d90ff0003ee329f2c1fb12887e5c4faa

2) https://bogor-tribunnews-com.cdn.ampproject.org/v/bogor.tribunnews.com/amp/2018/12/06/genjot-produksi-susu-dekan-sv-ipb-usulkan-tambah-populasi?amp_js_v=a2&amp_gsa=1&usqp=mq331AQHCAFYAYABAQ%3D%3D#referrer=https%3A%2F%2Fwww.google.com&amp_tf=Dari%20%251%24s&ampshare=http%3A%2F%2Fbogor.tribunnews.com%2F2018%2F12%2F06%2Fgenjot-produksi-susu-dekan-sv-ipb-usulkan-tambah-populasi

3) https://youtu.be/LiO7fhdsZTs

4) https://bogor.pojoksatu.id/baca/video-tahukah-anda-80-persen-kebutuhan-susu-indonesia-impor